DOCUMENT RESUME

ED 134 910 CG 011 115

AUTHOR Latta, R. Michael; And Others
TITLE Relation of Properties of Causal Attribution and Success Feedback to Performance Efficiency.
PUB DATE 6 May 76
NOTE 21p.; Paper presented at the Midwestern Psychological Association (Chicago, Illinois, May 6-8, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Attribution Theory; Experimental Psychology; *Feedback; Higher Education; Learning Theories; *Motivation; *Paired Associate Learning; *Performance; *Positive Reinforcement; Research; Verbal Learning

ABSTRACT

This study (N=160 males) examined the cognitive and behavioral effects of overt success feedback on subjects high and low in resultant achievement motivation (RAM). The cognitive effects of overt success feedback were investigated by requesting attributions to effort, ability, luck, and task difficulty concerning performance on a digit-symbol substitution task. Employment of a transfer design indicated overt success feedback to have an incentive motivation effect on performance efficiency at a subsequent verbal learning task. The results were interpreted within the general learning theory framework combined with the achievement and test anxiety models. The interpretation offered considers the various experimental conditions as sources of motivation. Overt success feedback is regarded as a source of incentive motivation, high RAM subjects are viewed as motivated by competition against standards of excellence, low RAM subjects are regarded as motivated by a threatening testing situation, and the attribution process is viewed as a cue defining the situation as achievement oriented. (Author)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED134910

Relation of Properties of Causal Attribution and Success Feedback to Performance Efficiency[1]

R. Michael Latta and Robert Schwander
Drake University
and
Richard L. Patten
Bemidji State College

[1] Paper presented at the annual meetings of the Midwestern Psychological Association, Chicago, May 6, 1976.

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CS 011 115

Abstract

This study (N = 160 males) examined the cognitive and behavioral effects of overt success feedback on subjects high and low in resultant achievement motivation (RAM). The cognitive effects of overt success feedback were investigated by requesting attributions to effort, ability, luck, and task difficulty concerning performance on a digit-symbol substitution task. Employment of a transfer design indicated overt success feedback to have an incentive motivation effect on performance efficiency at a subsequent verbal learning task. The results were interpreted within the general learning theory framework combined with the achievement and test anxiety models. The interpretation offered considers the various experimental conditions as sources of motivation. Overt success feedback is regarded as a source of incentive motivation, high RAM subjects are viewed as motivated by competition against standards of excellence, low RAM subjects are regarded as motivated by a threatening testing situation, and the attribution process is viewed as a cue defining the situation as achievement oriented.

Spence and his associates (e.g., Spence, Farber, & McFann, 1956) have provided evidence of the applicability of the multiplicative relation between drive (D) and habit (H) presented in Hullian learning theory to human verbal learning. More specifically, the basic Hullian formula R = f(D x H) leads to the prediction that a given increment in drive level (D) will facilitate performance (R) of well-learned or easily learned tasks (strong H) more than it will facilitate performance of poorly learned or difficult tasks (weak H). Spence, et al. (1956) tested this prediction with paired-associate verbal learning, using subjects scoring high or low on the Manifest Anxiety (MA) scale developed by Janet Taylor (1953) to define the D variable. The H variable was defined by using paired-associate lists that were either easy or difficult to learn with list difficulty determined by varying the degree of prior intra-pair and inter-pair association in the lists. The basic prediction that high D would enhance performance on the easy list (high H) more than performance on the difficult list (low H) was supported by the findings of Spence, et al. (1956).

The general drive function, D, is just one of several intervening variables involved in theorizing by Hull, Spence, Miller, Mowrer, Brown, et al., known collectively as "drive theory." Any test of part of a theory, such as the Habit x Drive interaction portion of Hull-Spence theory, must be considered with a view to boundary conditions determined by other parts of the theory. For example, all of the aforementioned "drive theorists" included an empirical law of reinforcement among the concepts of their theorizing, and the administration of a reinforcing stimulus such as overt success feedback (Warm, Kanfer, Kuwada, & Clark, 1972) would lead to behavioral predictions that differ from those for the Spence, et al.

(1956) situation, in which overt success feedback was not administered.

In the theoretical systems of Hull (1952) and Spence (1956), an empirical reinforcer not only increases the future probability of behavior instrumental in obtaining the reinforcer (the reinforcing function), but in addition, has nonassociative facilitating (incentive motivation, K) effects on subsequent behavior. Thus, the overt success feedback may have K effects as well as reinforcing effects on behavior. Incentive motivation effects are most clearly demonstrated using the "probe stimulus" technique (Brown, Kalish, & Farber, 1951) in which the facilitating effects of an acquired (secondary) reinforcer affect the performance of reference behavior which occurs soon after presentation of the reinforcing stimulus. The present research used an adaptation of the probe-stimulus technique by giving overt success feedback to subjects performing one task and then looking for facilitated performance on a subsequent unrelated task.

Recall that Spence, et al. (1956) selected their high and low D subjects from the extremes of a distribution of Taylor MA scores. The present research has selected subjects on the basis of <u>resultant achievement motivation</u> (RAM, Atkinson, 1964). This change in the operationalization of D was made because within the achievement model (Atkinson & Raynor, 1974), performance efficiency is hypothesized to be related to the strength of motivation in accordance with Hull-Spence drive theory. To examine this hypothesis, one must be able to define a number of levels of motivation. The sources of motivation that could be manipulated in testing this hypothesis are RAM, the incentive properties of success feedback, and the procedure of eliciting causal attributions to effort, luck, ability, and task

difficulty. The present study was designed to separate and examine the effects of these sources of motivation on simple and complex tasks. Control groups were employed to establish a performance efficiency baseline at the tasks.

Method

Subjects

Subjects consisted of 232 males enrolled in the introductory course in psychology. From this original sample, a sub-sample of 160 was selected on the basis of high and low RAM scores derived from the Mehrabian (1968) scale of RAM. This measure of achievement orientation has been used extensively as a measure of RAM (see, Weiner, Heckhausen, Meyer, & Cook, 1972). The sample used in the experiment consisted of the top and bottom 35% of the original distribution of 232 RAM scores.

Design

The between-subjects factors included two levels of RAM (high and low), two levels of overt feedback (success and none), and two levels of attribution (overt attribution and no attribution). A repeated measures factor for trial blocks was crossed with each level of each between subjects factor.

The no attribution groups have been included in the present study because of previous findings with failure feedback (Patten & White, Note 1; White & Patten, Note 2; White, Patten, & Fisher, Note 3) showing that the procedure of asking for causal attributions affects subsequent behavior independently of other variables. The present research examined the effects of causal attribution by comparing groups that either did or did not make overt causal attributions.

Procedure

When each subject arrived for the experiment, he was told the goal of the study was to determine the average performance of students on two different measures of intelligence. The tasks were described as intelligence tests to maximally arouse the motive to approach success as well as anxiety about failure. The basic procedure involved high and low RAM subjects receiving the feedback and attribution manipulations while performing one task (Task A), with the persisting incentive motivation effects of these conditions assessed during a subsequent task (Task B).

Task A. The first task was a digit-symbol substitution task involving six digits and six symbols. After a 30-sec. practice trial, there were six, 30-sec. test trials which consisted of the subject attempting to fill a single work-sheet of 50 possible substitutions. The subjects receiving feedback were given overt success feedback every even numbered trial. On these trials false norms were presented which indicated that the subject was doing twice as well as the average college student attempting the task. Before beginning the next trial, each subject required to make attributions was requested to check on each of six paired-comparison scales the extent to which ability, effort, luck, and task difficulty was important in determining his performance on the previous trial. For example, if the first paired-comparison involved effort and luck, the subject would make his attribution on the following scale:

EFFORT UNCERTAIN LUCK

:_____:_____:_____:_____:_____:_____:_____:_____:_____:_____:

1 10 20 30 40 50 60 70 80 90 99

Attributions were made in response to the question: "Which of these factors, effort or luck, influenced your performance on the previous

trial to a greater extent?". Attributions were the dependent measures for Task A.

Task B. Upon completion of Task A, all subjects learned one of the paired-associate lists used by Spence, et al. (1956). Following a practice trial, the lists were presented in three different random orders at a 2:2 rate on a standard memory drum with no feedback about performance given at any time. On each trial, the number of correct anticipations of verbal paired-associate response items was recorded as the dependent measure. The criterion for learning was two successive trials without an error as in Spence, et al. (1956). If the criterion for learning was not met within twenty trials, the task was terminated.

Results

Task A

Prior to data analysis, the attribution scores were converted to normalized ranks to improve reliability and summed over trials for each subject (Wolins & Dickinson, 1973). Using the paired-comparisons technique and the law of comparative judgements (Nunally, 1967), it was possible to scale the four causal factors. This resulted in four correlated scores for attributions (one for each causal factor) for each of the 80 subjects required to attribute.
A 2 X 2 MANOVA indicated RAM to be the only significant source of variation in the attributions. Univariate tests indicated the RAM effect was statistically significant only for attributions to luck and task difficulty. There was a tendency for high RAM subjects to attribute performance more to effort than low RAM subjects, but the difference was not less probable than 1 in 10. Table 1 displays the mean attribution scores for subjects high and low in RAM after averaging over trials along with the univariate F values.

Insert Table 1 About Here

Pooled-within-cell correlations among RAM, attributions to the four causal factors, and the performance measure from Task B indicated RAM was positively related to attributions to aiblity, r (78) = .21, $p < .05$, and task difficulty, r (78) = .24, $p < .05$, and negatively related to attributions to luck, r (78) = -.42, $p < .01$. RAM was not significantly related to performance on the paired-associates lists when employed as a continuous variable. Attributions to some of the causal factors were significantly correlated. Luck attributions were negatively related to attributions to effort, r (78) = -.59, $p < .01$, ability, r (78) = -.53, $p < .01$, and task difficulty, r (78) = -.39, $p < 01$. None of the attributions to causal factors were related to the performance measure from Task B.

Task B

Results of an ANOVA on a 2 X 2 X 2 X 5 factorial involving the between subjects factors RAM, attribution, feedback on Task A, and the within-subjects factor of trial blocks is presented in Table 2 for number of correct anticipations of the paired-associates lists.

Insert Table 2 About Here

Performance Efficiency on the Easy List. Figure 1 presents the group mean verbal learning scores of the 16 different groups employed in the present study after averaging over trial blocks. The mean number of correct anticipations increased at the same rate accross the five trial blocks for all groups learning the easy list with the following minor variation: low RAM control subjects (those making no overt attributions and receiving no Task A feedback)

made fewer correct anticipations on Blocks 2 and 3 ($p < .01$ for both comparisons) than the other groups working on the easy list. However, these differences were not present on Blocks 1, 4, and 5. Comparisons among the group means indicated in Fig. 1 for the easy list failed to reveal any significant differences after averaging over Blocks.

Performance Efficiency on the Difficult List. The bottom two curves in Fig. 1 present the performance of the eight groups of subjects learning the difficulty list after averaging over Blocks. Newman-Keuls tests on pairwise comparisons revealed that for high RAM groups, subjects receiving either Task A feedback or attribution had more correct anticipations than subjects receiving either feedback plus attribution or neither feedback nor attribution ($p < .05$). There was a similar tendency for low RAM subjects receiving no feedback plus attribution to produce fewer correct anticipations than the baseline represented by the no feedback plus no attribution control subjects ($p < .10$).

Comparisons between high and low RAM groups indicated significant differences at all four combinations of attribution and feedback conditions ($p < .05$). That is, high RAM subjects receiving either feedback or attributions produced more correct anticipations than the low RAM subjects receiving the same conditions; however, high RAM subjects receiving neither feedback nor attribution, or feedback plus attribution produced fewer correct anticipations than low RAM subjects receiving the same conditions ($p < .05$).

Discussion

The results of this investigation are consistent with the effects of multiple sources of drive on performance efficiency predicted from achievement theory (Atkinson & Raynor, 1974) and

general learning theory. Here, the various experimental conditions are regarded as sources of motivation, with overt success feedback regarded as a source of incentive motivation in accordance with general learning theory principles. The finding that success feedback on Task A (digit-symbol) facilitated performance efficiency and rate of learning on a different, subsequent task (paired-associates) is consistent with the notion of success feedback as a source of incentive motivation.

Besides feedback, the authors' interpretation employs the conception that both high and low RAM, and the attribution process are sources of motivation. In the authors' view, high RAM subjects are said to be primarily motivated by competition against standards of excellence where knowledge of results is available, while low RAM subjects (high test anxious) are regarded as more highly motivated than high RAM subjects by the threatening testing situation used in the present and other studies (Mandler & Sarason, 1952). Overt attribution is not itself regarded as a source of motivation, but as a cue that functions to define the situation as achievement oriented, and thus arouses sources of motivation (see Patten & White, Note 1; White & Patten, Note 2; and White, Patten, & Fisher, Note 3 for the application of this approach to failure feedback).

This conception of multiple sources of drive can be applied to the results of performance efficiency on the paired-associate lists. In general, the speed with which the easy paired-associate list was learned is most likely due to maximum accuracy of responding with minimal motivation. Thus, little response variability was available to indicate the effects of sources of drive that differed between the groups, rendering the task unsuitable for demonstrating the

effects of multiple sources of drive (Broen & Storms, 1961). However, the finding that low RAM (high test anxious) control subjects learned the easy paired-associates more slowly than all other groups is consistent with the suggestion that an easy list does not produce as much test anxiety as a more threatening difficult list (Speilberger & Smith, 1966).

Interpretation of group differences in performance efficiency on the difficult list is not as simple as that of the easy list. Recall: a) that low RAM subjects are regarded as more motivated by testing situations and difficult tasks than are high RAM subjects, and b) that high RAM subjects are not motivated to work until cues (from feedback or attribution procedures) indicate standards of excellence are to be applied. This differential arousal of drive in high and low RAM individuals is why the low RAM subjects performed more efficiently on the difficult paired-associates list compared to high RAM subjects under contorl conditions. Here, the low RAM subjects were optimally motivated by the threat of the difficult list alone, while high RAM subjects were less than optimally motivated without the cue value of attribution procedures making standards of excellence salient or the incentive motivation of success feedback on Task A. However, what happens when additional sources of drive are added to the already existing pool of motivation? Here, feedback and attribution on Task A are regarded as producing a total level of drive having a debilitating effect on the performance efficiency of low RAM (high test anxious) subjects when added to drive already present due to test anxiety aroused by the threatening difficult list. For low RAM subjects, this "overmotivation effect" is produced by success feedback and/or attribution on Task A. On the other hand.

high RAM subjects in the present study did not suffer from debilitating overmotivation until both attribution and feedback manipulations were combined on Task A.

The present "overmotivation" interpretation is consistent with research cited in Atkinson and Raynor (1974) where nonmonotonic relations between performance efficiency and level of motivation were reported with n Achievement, anxiety, n Affiliation, and ego threatening instructions serving as sources of drive. The thrust of that research, and the present investigation, is that the relation of individual differences in n Achievement and anxiety to performance efficiency can be positive, negative, zero, or curvilinear, depending upon other sources of motivation and the difficulty level of the task. The assumption of a simple positive monotonic relation of level of motivation and performance efficiency is unlikely to hold except for moderately difficult laboratory tasks. Simple tasks will yield no relation due to lack of variability in performance efficiency measures, while difficult tasks will most likely yield a curvilinear relation which can easily be mistaken for no relation if only a Pearson r is used as an index of association. Finally, a negative relation will be indicated if only relatively highly motivated subjects are involved in the experiment, along witha moderately difficult task.. Future research on the relation of drive level to performance efficiency should consider all the possibilities.

The concept of multiple sources of motivation also implies other considerations for future research in this area. The authors' interpretation employs the conception that both RAM and test anxiety (or the inverse of RAM) are sources of drive. However, the present results and other results reported in Atkinson and Raynor (1974) support the general conception that individuals classified as high and

low in RAM differ in the kinds of stimuli to which they respond. High RAM individuals respond primarily to competition against standards of excellence, while low RAM individuals who happen to be highly test anxious respond to a threatening test situation. In view of this, it may be unwise in future studies to attempt direct comparisons of these two types of individuals, except when the object is to discover additional differences in the kinds of stimuli to which they respond. Since test anxiety and n Achievement are confounded in the currently available objective and projective tests, investigation of the general drive functions of these variables would appear to require the development of tests in which these variables can be manipulated independently of each other. Perhaps researchers in the area should consider those individuals high in both n Achievement and test anxiety as highly motivated rather than not motivated at all as the achievement model suggests. Future research should provide evidence supporting or refuting the "overmotivation" hypothesis suggested here.

Reference Notes

1. Patten, R. L., & White, L. A. Relation of causal attribution to achievement behavior. Paper presented at the annual meetings of the Midwestern Psychological Association, Chicago, 1973.

2. White, L. A., & Patten, R. L. Relation of achievement motivation and overt attribution to persistence. Paper presented at the annual meetings of the Midwestern Psychological Association, Chicago, 1975.

3. White, L. A., Patten, R. L., & Fisher, W. Test conditions and achievement motivation as determinants of causal attributions. Paper presented at the annual meetings of the Midwestern Psychological Association, Chicago, 1976.

References

Atkinson, J. W. An introduction to motivation. New York: Van Nostrand, 1964.

Atkinson, J. W., & Raynor, J. O. Motivation and achievement. New York: John Wiley and Sons, 1974.

Broen, W. E., Jr., & Storms, L. H. A reaction potential ceiling and response decrements in complex situations. Psychological Review, 1961, 68, 405-415.

Brown, J. S., Kalish, H. I., & Farber, I. E. Conditioned fear as revealed by startle response to an auditory stimulus. Journal of Experimental Psychology, 1951, 41, 317-328.

Mandler, G., & Sarason, S. B. A study of anxiety, failure, and learning. Journal of Abnormal and Social Psychology, 1952, 65, 166-173.

Mehrabian, A. Male and Female scales of the tendency to achieve. Educational and Psychological Measurement, 1968, 28, 493-502.

Nunally, J. Psychometric theory. New York: McGraw Hill, Inc., 1967.

Spielberger, C. D., & Smith, L. H. Anxiety (drive) stress and serial position effects in serial verbal learning. Journal of Experimental Psychology, 1966, 72, 589-595.

Spence, K. W., Farber, I. E., & McFann, H. H. The relation of anxiety (drive) level to performance in competitional and noncompetitional paired-associates learning. Journal of Experimental Psychology, 1956, 52, 296-305.

Taylor, J. A. A personality scale of manifest anxiety. Journal of Abnormal and Social Psychology, 1953, 48, 285-290.

Warm, J. S., Kanfer, F. H., Kuwada, S., & Clark, J. L. Effects of self-evaluation and experimenter-controlled feedback. Journal of Experimental Psychology, 1972, 92, 123-127.

Weiner, B., Heckhausen, H., Meyer, W., & Cook, R. E. Causal ascriptions and achievement behavior. Journal of Personality and Social Psychology, 1972, 21, 238-248.

Wolins, L., & Dickinson, T. L. Transformations to improve reliability and/or validity for affective scales. Journal of Educational and Psychological Measurement, 1973, 33, 711-713.

Table 1

Mean Attribution Scores for High and Low RAM Subjects after Summing Across Six Trials

	Effort	Ability	Luck	Task Difficulty
High RAM	2355	2282	0.0	1768
Low RAM	2096	2152	643	1513
F Value	2.57*	< 1	9.15***	3.93**

* $p < .10$

** $p < .05$

*** $p < .01$

Table 2

Analysis of Variance for Number of Correct Anticipations on the Easy and Difficult Paired-Associates Lists

		Easy List		Difficult List	
Source	df	MS	F	MS	F
Resultant Achievement Motivation (RAM)	1	.64	< 1	122.10	< 1
Feedback (FB)	1	39.69	< 1	140.42	< 1
Attribution (AT)	1	33.64	< 1	33.06	< 1
RAM X FB	1	182.25	1.12	63.20	< 1
RAM X AT	1	125.44	< 1	14.82	< 1
FB X AT	1	320.41	1.96	1193.70	5.31*
RAM X FB X AT	1	.25	< 1	3739.32	16.63***
Subjects Within (RAM X FB X AT)	72	163.23		224.80	
Blocks (BK)	4	5155.75	123.83***	11848.08	724.38***
RAM X BK	4	40.50	< 1	5.30	< 1
FB X BK	4	25.30	< 1	2.25	< 1
AT X BK	4	19.54	< 1	55.49	3.39**
RAM X FB X BK	4	14.14	< 1	37.03	2.26
RAM X AT X BK	4	21.09	< 1	14.53	< 1
FB X AT X BK	4	30.86	< 1	13.50	< 1
RAM X FB X AT X BK	4	98.23	2.36*	39.77	2.43*
BK X Subjects Within (RAM X FB X AT X BK)	288	41.64		16.36	

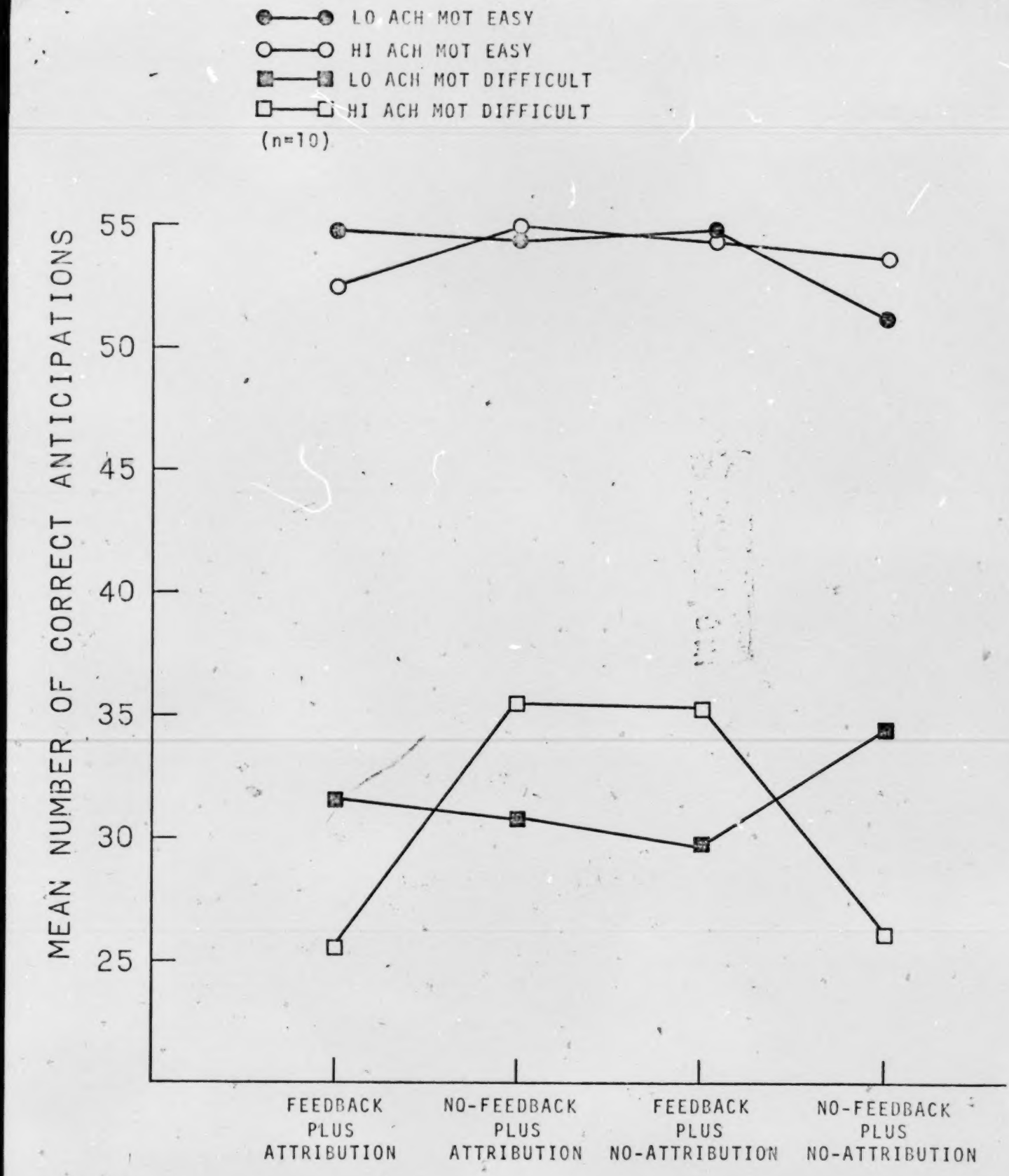
* $p < .05$

** $p < .01$

*** $p < .001$

Figure Captions

Figure 1. Mean number of correct anticipations on the easy and difficult paired-associates lists as a function of the sixteen experimental conditions. Abbreviations are as follows: LO ACH MOT EASY = Subjects low in RAM learning the easy paired-associates. LO ACH MOT DIFFICULT = Subjects low in RAM learning the difficult paired-associates. HI ACH MOT EASY = Subjects high in RAM learning the easy paired-associates. HI ACH MOT DIFFICULT = Subjects high in RAM learning the difficult paired-associates.


LO ACH MOT EASY
HI ACH MOT EASY
LO ACH MOT DIFFICULT
HI ACH MOT DIFFICULT
(n=10)
MEAN NUMBER OF CORRECT ANTICIPATIONS
55
50
45
40
35
30
25
FEEDBACK PLUS ATTRIBUTION
NO-FEEDBACK PLUS ATTRIBUTION
FEEDBACK PLUS NO-ATTRIBUTION
NO-FEEDBACK PLUS NO-ATTRIBUTION